North American Drought Monitor – March 2005

Canada: During March, precipitation was well below average in the southwest coastal region of British Columbia, throughout much of the southern half of Alberta, parts of the east-central agricultural region of Saskatchewan and northwest agricultural region of Manitoba, much of north central and southern Ontario, and southern Quebec.

Precipitation since September 1 has been above average in much of British Columbia. Snow melt during November and January combined to reduce the spring snowpack to below-normal levels. Reservoirs were generally at full supply level. Groundwater levels were generally at average to much-above-average levels; however, for the north Okanagan, groundwater levels were stable and at the historic minimum; groundwater levels for the central Okanagan were rising but below average; south Okanagan groundwater levels were rising and slightly above the historic minimum; southeast Cranbrook groundwater levels were rising but below average, and; Golden south groundwater levels were stable and below average for this time of year. Groundwater levels for surficial wells on central Vancouver Island were declining and below average. Low streamflows later in the season may create issues for fish populations and some towns that take water directly from rivers. Moderate drought (D1) and abnormally dry conditions (D0) are identified for the very southern parts of British Columbia. Based on an April-July volume runoff forecast of 760 $kdam^3$ (620,000 acre-feet), or 45 percent of the 1971-2000 normal, for the Similkameen River at Nighthawk, the International Osoyoos Lake Board of Control has issued a formal drought declaration with respect to the operation of the Zosel Dam on Osoyoos Lake near Oroville.

Drought conditions improved in some areas of Alberta during the past month. Southern and east- central Alberta were designated abnormally dry (D0) or in moderate drought (D1) as of March 31. The following flow volume forecasts were published by Alberta Environment as of April 1, 2005: below- to much-below-average natural runoff volumes for the March-September 2005 period in the Milk River and Oldman river basins (values for the March-September 2005 period for the Oldman River at Lethbridge would rank 18th lowest in 90 years); below average to average in the Bow River basin; and near average in basins further north. Soil moisture reserves were below average in much of the southern and east-central regions of Alberta.

The 2005 spring runoff forecast in Saskatchewan ranged from well below normal in the southwest and south-central areas to slightly above normal in northern areas of the grainbelt region. Average and above-average runoff is forecast for the northern region of the province. Many areas in southern and east-central Saskatchewan were abnormally dry (D0) or in moderate drought (D1).

Most of Manitoba has had average or above-average precipitation since September 1, 2004. The one exception is the northwest agricultural region near the Saskatchewan border, where moderate drought (D1) and abnormally dry conditions (D0) were defined. With warm, mostly dry weather in early and mid-April, spring wheat seeding started early and proceeded ahead of the average pace in much of the southern half of the grain growing region.

Much of Ontario had abnormally dry weather during March. There were no confirmed low flow conditions. Abnormal dryness (D0) was defined in the southern part of the northwest region, along with north-central and southeast regions of the province. Farther east, there were some abnormally dry conditions in western Quebec, but no drought concerns.

Monthly precipitation was above normal across New Brunswick, with the highest amounts in the northwest. Most of the precipitation fell as snow in the northwest and as a result the snow pack increased to above normal. Most of the precipitation fell as rain in southern areas, causing large increases in runoff. Accumulated precipitation for the past 3- and 6-month periods increased in all areas but still remained below normal over most of the province. Monthly runoff rates were near or above normal in southern and eastern areas, but below normal in the northwest, where most of the precipitation fell as snow. A rainfall event near the end of the month resulted in very high runoff rates in southern areas, with runoff in some streams reaching more than 500 percent of normal. Observation wells in most areas of the province were above normal. Moisture and water-supply conditions were average or above average in most of the remainder of the Atlantic region.

United States: The mid-March arrival of much-needed precipitation improved prospects for Northwestern pastures and winter grains, but provided only limited relief from long-term, hydrological drought. Meanwhile, heavy snow blanketed the northern High Plains, providing highly beneficial moisture for pastures and winter wheat, despite underlying subsoil moisture shortages. Despite the mid- to late-March rain and snow, a large, core area of severe to extreme drought (D2 to D4) remained intact, stretching from Washington and Oregon eastward to the northern half of the High Plains. Farther south, mid- to late-March precipitation maintained abundant high-elevation snow packs from the Sierra Nevada eastward to the Four Corners States. Sustained cold-season storminess continued to erode or eradicate long-term drought in the Southwest, leaving only pockets of moderate to severe drought (D1 to D2). In contrast, southern Oklahoma and adjacent areas experienced a March drying trend, promoting fieldwork but reducing topsoil moisture reserves and resulting in the introduction of abnormal dryness (D0). D0 was also introduced across southernmost Texas. Drier-than-normal March weather prevailed in much of the Midwest, allowing spring planting preparations to begin. Elsewhere, frequent storminess affected the South and East. Rainfall, initially beneficial across the Southeast and instrumental in eliminating pockets of abnormal dryness (D0), began to hamper planting operations and other spring fieldwork late in the month.

Cold weather prevailed across the eastern half of the nation during the first 3 weeks of March, followed by a late-month warming trend. Monthly temperatures generally ranged from 2 to 6°F (1 to 3°C) below normal in the Great Lakes and Northeastern States. In contrast, early-month warmth in the West yielded to stormy, cooler weather thereafter. Nevertheless, March readings averaged as much as 5°F (3°C) above normal across the northern Plains and the Northwest.

Unfavorably warm, dry conditions persisted in the Northwest early in the month. More than 300 daily-record highs were set or tied during the first half of March, mostly across the West. Dallesport Airport, Washington, located just across the Columbia River from The Dalles, Oregon, collected seven consecutive daily-record highs from March 5-11, with a maximum temperature of 76°F (24°C) on March 9. In Oregon, high temperatures climbed to 76°F (24°C) on

March 11 in Redmond, Troutdale, and Hillsboro. For all three locations, it was the earliest spring observance of a high temperature greater than 75ºF, or 24ºC (previously, March 15, 1959, in Redmond; March 27, 1994, in Troutdale; and March 28, 1994, in Hillsboro). Farther south, monthly record warmth arrived in northern California on March 11, when highs soared to 89ºF (32ºC) in Salinas (previously, 88ºF [31ºC] on March 26, 1969), 88ºF (31ºC) in downtown Oakland (previously, 85ºF [29ºC] on March 10, 2004), and 87ºF (31ºC) in downtown San Francisco (previously, 86ºF [30ºC] on March 18, 1914).

March precipitation totals were not spectacularly high in the Northwest, but even near-normal amounts were welcomed in the wake of near-record dryness from October to February. Salem, Oregon, netted 4.15 inches (99.5 percent of normal), or 105.4 mm, for the month, boosting its October-March total to 15.40 inches (49.7 percent), or 391.2 mm. Elsewhere in western Oregon, the April 1 snow depth at Mt. Hood Meadows was 49 inches (39 percent of normal), or 124.5 cm, breaking the 1992 record low of 55 inches (139.7 cm).

In sharp contrast, July-March rainfall records were established in southern California locations such as Oxnard (30.93 inches [785.6 mm], or 211 percent of normal) and Avalon (25.74 inches [653.8 mm], or 231 percent). Records in both locations have been maintained since 1948. Sandberg, California, netted a 9-month total of 29.33 inches (252 percent of normal), or 745.0 mm, second only to a 31.37-inch (796.8 mm) annual sum from July 1977 - June 1978. In downtown Los Angeles, California, where records have been kept since 1877, the season-to-date rainfall climbed to 36.01 inches (258 percent of normal), or 914.7 mm. The only wetter July-June period on record in Los Angeles occurred in 1883-84, when rainfall totaled 38.18 inches, or 969.8 mm. Farther inland, in Utah's Wasatch Range, March precipitation at Alta totaled 13.21 inches (200 percent of normal), or 335.5 mm, including 153.6 inches (390.1 cm) of snow. Much of Alta's snow fell during two exceptionally stormy periods—March 19-25 (78 inches, or 198.1 cm) and 28-30 (64 inches, or 162.6 cm)—which helped to boost its season-to-date (October-March) total to 575.1 inches, or 1,460.8 cm.

In Montana, Great Falls noted a monthly record snowfall of 27.8 inches (252 percent of normal), or 70.6 cm, lifting its season-to-date total to 51.2 inches (101 percent), or 130.0 cm. All of Great Falls' snow, which eclipsed the March 1982 record of 26.1 inches (66.3 cm), fell from March 12-24. March snowfall (12.1 inches, or 30.7 cm) also accounted for more than half of the season-to-date total in Havre, Montana, where the October-March sum was 21.7 inches (55.1 cm). In contrast, monthly snowfall measured 1 inch (2.5 cm) or less in locations such as Wichita, Kansas, Cedar Rapids, Iowa, and Huron, South Dakota, keeping the cities' respective season-to-date totals at less than half normal. Through March 31, seasonal snowfall totaled 7.3 inches, or 18.5 cm (46 percent of normal) in Wichita; 11.8 inches, or 30.0 cm (43 percent) in Cedar Rapids; and 11.9 inches, or 30.2 cm (31 percent) in Huron. A single storm interrupted the March pattern of below-normal upper Midwestern snowfall. That storm struck from March 17-19, dumping heavy snow on cities such as Sioux Falls, South Dakota; LaCrosse, Wisconsin; and Rochester, Minnesota. Rochester experienced its snowiest day ever (19.8 inches [50. 3 cm] on March 18), surpassing the record of 15.4 inches (39.1 cm) set on January 22, 1982. Rochester's storm-total snowfall reached 20.2 inches (51.3 cm).

March precipitation totaled less than 25 percent of normal in several locations across the Plains and Midwest, including Rockford, Illinois (0.43 inch [10.9 mm], or 18 percent of normal); Goodland, Kansas (0.25 inch [6.4 mm], or 21 percent); and St. Joseph, Missouri (0.53 inch [13.5 mm], or 22 percent). Only 0.74 inch (29 percent of normal), or 18.8 mm, fell in Detroit, Michigan, representing the city's fifth-lowest March total since 1870. Meanwhile, very dry weather also prevailed across parts of the Caribbean, where San Juan, Puerto Rico, observed its driest month on record. Only a trace (2.14 inches [54.4 mm] below normal) fell in San Juan, breaking its March (0.72 inch [18.3 mm] in 1970) and all-time monthly records (0.08 inch [2.0 mm] in April 1997).

Southern wetness boosted monthly rainfall totals to more than twice normal in locations such as Pensacola, Florida (12.93 inches [328.4 mm], or 202 percent of normal); Naples, Florida (5.22 inches [132.6 mm], or 251 percent); and Victoria, Texas (4.76 inches [120.9 mm], or 212 percent). More than half (7.48 inches [190.0 mm]) of Pensacola's precipitation fell on March 31, when torrential rains erupted across parts of the Southeast. On March 31 - April 1, 24-hour rainfall totals reached 8.30 inches (210.8 mm) in Mobile, Alabama, and 13.96 inches (354.6 mm) in Pensacola.

Mexico: March is typically the driest month of the year, with a monthly average rainfall of just 15.2 mm across the country. In comparison, Mexican rainfall averages greater than 100 mm per month from June to September.

A small area of D0A (agricultural, short-term dryness) was introduced in northern Tamaulipas, where year-to-date rainfall deficits continued to grow. Just across the border in Brownsville, Texas, January-March rainfall totaled 40.4 mm, or 46 percent of normal. Nevertheless, water storage in the lower Rio Grande (Rio Bravo) basin recently climbed to its highest level since 1992. The surface elevation of the International Falcon Reservoir stood at 290.38 feet (88.5 m) above sea level on March 1, but fell 4.39 feet, or 1.3 m (due to increased demands from municipalities and irrigation districts), by April 16. Similarly, the International Amistad Reservoir had a surface elevation of 1113.42 feet (339.4 m) on April 16, down 1.19 feet (0.4 m) from the March 1 level.

Farther south along the Gulf Coast, some abnormal dryness was trimmed from southern Tamaulipas due to above-normal March rainfall. However, March showers largely bypassed the moderate to severe drought (D1 to D2) crescent stretching from southern and eastern Vera Cruz across Tabasco and into parts of the Yucatan Peninsula, resulting in little change in the drought depiction. In contrast, moderate drought made the transition to abnormal dryness in southernmost Chiapas, where there were some unseasonably heavy showers, including the nation's highest monthly total (179.8 mm in Escuintla).

There were some moderate showers (greater than 25 mm) in southern Michoacan, where the belt of abnormal dryness (D0) along and near the Pacific Coast was broken. Elsewhere, a sliver of long-term, hydrological dryness persisted along the U.S.-Mexican border in northern Sonora.